"Comparing the effect of High-Intensity Interval Training and Aerobic Exercise on Musculoskeletal and Psychological problems among university students"

SHORT SYNOPSIS

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by

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Certificate

I hereby declare that the short synopsis "Title- **Comparing the effect of High-Intensity Interval Training and Aerobic Exercise on Musculoskeletal and Psychological problems among university students"** being submitted in partial fulfilment of the requirement for the degree of Doctor of Philosophy in Physiotherapy under Faculty of Allied Health Sciences of Manav Rachna International Institute of Research & Studies, Faridabad during the academic year 2023-24.

It is a bona fide record of original work carried out under the supervision of Dr. Moattar Raza Rizvi and has not been submitted in full or part to any other university or institute for degree or diploma. Further, it is certified that short synopsis is plagiarism free and proof has been submitted.

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ABSTRACT

Background/Introduction: Allied health students enrolled in undergraduate programs for physiotherapy, dental and pharmacy undergo rigorous theoretical as well as hands on training. Due to the nature of the program, the curriculum and hands on experience, students may undergo psychological problems like stress, anxiety and depression. Numerous studies have explored that these students have several musculoskeletal problems also mainly back pain and hand function problems. **Objective**: the present study will investigate the status of psychological problems like anxiety, depression, burn out and self-efficacy in students. The study will also explore the effects of two different interventions on the musculoskeletal problems experienced by students. **Method:** This will be experimental study design and will recruit participants with a total sample size of 138. The participants will be randomly allocated to three different groups (n=46). The three interventions given to the groups will be Group 1 – high intensity interval training for five sessions per week for 6 weeks, Group 2 – Aerobic exercises for five sessions per week for 6 weeks, Group 3 – control group which will be not be given exercise but education using Pamphlet. Outcome variables for the study are General health questionnaire, Beck depression inventory, Beck anxiety inventory, General Self efficacy scale, Machlachs burn out inventory, Oswestry Low Back Pain Disability Questionnaire, Purdue peg board test, and Hand grip strength using Jamar dynamometer. **Results:** The expected result of the study is going to bring significant improvement in outcome variables (musculoskeletal and psychological problems) from pre-post evaluation. The outcome of this study will help in selection of best exercise intervention program to alleviate the musculoskeletal and psychological problems in university students.

Keywords: high intensity interval training, aerobic training, anxiety, depression, burn out

Abbreviations:

HIIT – high intensity interval training

LBP – low back pain

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INTRODUCTION

Study of medical sciences and its allied fields are considered to be one of the most reputed, at the same time one of the most challenging study courses in India. In India a large number of students enrol themselves to these courses each year. In physiotherapy there are 183 colleges offering bachelor of physiotherapy as per Indian Association of Physiotherapist. Around 10,000 new students take admission every year into Bachelor of Physiotherapy. According to Dental council of India in the year 2021-22 the total number of seats available at undergraduate level was 27868. These students undergo rigorous training of medical subjects like anatomy, physiology, biochemistry, pathology of human body. Subjects like pharmacology, surgery, general medicine, gynaecology are also part of their curriculum. Physiotherapy students also study subjects like biomechanics of human body, orthopaedics, neurology, cardiopulmonary, and sports medicine. They study various disorders/conditions in these subjects and they also study detailed physiotherapy assessment and physiotherapy management of these disorders. Physiotherapy students also study their course specific subjects like electrotherapy, exercise therapy, physiotherapy in orthopaedics, physiotherapy in neurology, physiotherapy in cardiopulmonary and so on. Similarly dental and pharmacy students also study medical subjects and subjects pertaining to their specialisation. They require to have extensive theoretical as well as hands on training to be able to assess and treat their patients with evidence based therapies. These details have been derived from various university syllabus of bachelors level of physiotherapy, dental and pharmacy courses which is being followed by different universities in India.

It has been studied around the world that due to extensive training and constant pressure to perform well, undergraduate medical students face problems with their psychological wellbeing. (E A Guthrie, D Black, C M Shaw, J Hamilton, F H Creed, 1995) Medical students experience burnout, stress, depression and sometimes suicidal attempts. All these problems are more commonly experienced by students pursuing medical courses in comparison to general population. (Maser et al., 2019) Medical students experience depressive symptoms, stress, anxiety and psychological illness as studied in many countries around the world (Anonymous, 2021; E A Guthrie, D Black, C M Shaw, J Hamilton, F H Creed, 1995; Maser et al., 2019; Saipanish, 2009; Schwenk et al., 2010) There are various factors studied as per the country, their medical education system and social norms(Yousuf et al., 2013). The factors that came across were fear of failure, fear of not getting the desired Postgraduate

course or subject, difficulty in adjusting with such high demands of the medical studies, lack of time for family, friends, and hobbies. (Coverdale et al., 2021),(Kirch, 2021),(Bamuhair et al., 2015),(Cherkil et al., 2013) And the most important and concerning point that came out was the stigma associated with depression in medical students. Students have a fear of stigma that they will be viewed as a person who is weak and is incapable of providing treatment and care to other people. How can a person who is doing a medical course can himself become a patient? Due to such thinking students fear and hesitate to open up about their challenges and signs and symptoms that might develop in them due to depression or other related psychological problems.(Kirch, 2021),(Coverdale et al., 2021)

Depression, anxiety and stress have been studied in Indian medical and allied health students as well and the results were concerning as the students are experiencing all these problems. Female students were more affected as compared to male students.(Siddharth Sarkar, Rishi Gupta, 2017) Physiotherapy students in India, also experience such problems where they are not able to cope up with pressure related to studies and profession. They find lack of time to unwind themselves from academic pressure. Physiotherapy is a challenging field where students not only have to study the medical subjects but also have learn a lot of hands on treatment. Not only this they also have to learn to understand the emotional issues that their patients are going through and they constantly have to motivate their patients and be empathetic towards them. In India, there has not been extensive studies on stress levels of physiotherapy students. (Tushar J Palekar, M G Mokashi 2014) studied the factors which can lead to stress in physiotherapy students. Their study revealed that "unpredictability of exams, fear of failure, staying away from home, high expectations of parents for good academic performance, changes in teaching methods from school to graduate college, staying away from friends, better performance of other students and competition to secure post graduate seats were factors which produced stress in students.(Tushar J Palekar, 2014)

Physiotherapy students not only experience stress, studies report that students can develop depression. (Schwenk et al., 2010),(Brazeau et al., 2014), (Gautam et al., 2020), (Yadav et al., 2016)(Balkishan Sharma, Rajshekhar Wavare, 2013) studied physiological changes and depression which the students can encounter mainly during the examination time. The study revealed that there is significant change in vital parameters during examination. And extreme depression was

also present in MBBS students (boys – 7.9%, girls – 11.8%) and physiotherapy students (girls - 10.7%). Moderate to mild depression was also seen in the students.(Sharma et al., 2013)

(Kitiş et al., 2017; Ng et al., 2019; Suija et al., 2009; Trivedi, 2004)Various researchers have tried to study the effect of depression, anxiety or stress on the musculoskeletal system of the body(Ng et al., 2019; Suija et al., 2009). And have found that there is a strong correlation between severity of psychological issues and with the appearance and episodes of musculoskeletal problems like back pain (Pinheiro et al., 2015), joint pain, neck pain(Liu et al., 2018), and hand functions (Sasayama et al., 2012; Zasadzka et al., 2021). (Currie & Wang, 2005) Suggested that people with depression has higher chances of getting low back pain. And factors like leaves from work, the chronic nature of the problem and disability are also associated with depression and low back pain. Physiotherapy students have high incidence of low back pain (Chiwaridzo et al., 2018). This pain is associated with various factors like physical activity, stress, visit to doctor in last 12 months, self- reported LBP, and sleep satisfaction (Morais et al., 2018). Understanding musculoskeletal problems and treating the pains like back pain are very important as these students are going to be future physiotherapist and will be fulfilling the professional demands. (Ezzatvar et al., 2019) suggested that physiotherapists are extremely prone and at risk for the development of musculoskeletal problems, back pain and neck pain due to certain factors like working in seated position, working in private clinics, long work experience and high workload. Therefore, understanding and treating their musculoskeletal pain in student life itself will be beneficial for the physiotherapy students as in future they are going to face the challenges of the occupation.

Hand function including grip strength and dexterity are important aspects for normal functioning of the hand. Different researchers(Fukumori et al., 2015; Gu et al., 2021; Mutz et al., 2022; Sasayama et al., 2012; Zasadzka et al., 2021) have studied the association of hand functions in patients with psychological problems (like depression and anxiety) among different age groups and populations and have found that there is a correlation between the two.(Marques et al., 123 C.E.) explored that grip strength can be considered as a factor to evaluate a person's health and they also suggested that healthcare practitioners must screen patients for psychological issues like depression and anxiety if the patient shows reduced grip strength. (Kandola et al., 2020; Kerry & Murray, 2021) also suggested similar finding in their studies. Kandola et al., 2020 evaluated in their prospective cohort study that low cardiorespiratory endurance and low grip strength strongly correlated with common

mental disorders like depression, stress and anxiety. So, the present study also wants to evaluate if grip strength weakness is present in physiotherapy students who are experiencing problems like anxiety, stress, and depression. And the study also wants to find out the effect of different exercise interventions on grip strength and dexterity.

The role of exercise in reducing the symptoms of stress, anxiety and depression has been studied by different researchers(Elizabeth Aylett, Nicola Small, 2018; Herbert et al., 2020; Paolucci et al., 2018). In a meta-analysis by (Leahy et al., 2020) suggested that high intensity interval training improves cognitive functions and mental health in children and adolescents. (Borrega-Mouquinho et al., 2021) compared the effects of exercises given at two different intensity levels – high intensity and moderate intensity interval training on stress, anxiety and depression and concluded that both the intensities reduce stress, anxiety and depression but high intensity exercises produce better effects than moderate intensity. The other form of exercise which interests the researchers in this field is aerobic exercises. (Edwards & Loprinzi, 2019) explored the effects of acute bouts of aerobic exercises for 10 minutes on exhaustion, tranquillity and revitalisation. The results suggested positive effects. Aerobic exercises have been found to be effective in major depressive disorders as well(Brush et al., 2020). Apart from high intensity interval training and aerobic exercises various other types of exercises and interventions has been studied to see whether these can bring changes in the level of stress, anxiety and depression like resistance training, mild physical activity like walking or jogging, relaxation exercises, and deep breathing exercises. Interventions like cognitive behavioural therapy and mindfulness has been studied in the same context. But a consensus on what type of exercise is best for psychological problems remain elusive. So, the present study want to compare two exercises program that is high intensity interval training and aerobic exercises.

The present study also wants to take into consideration the concept of self-efficacy in students. Self-efficacy is a concept that has been the interest of researchers from the time researchers like Albert Bandura and Nancy. E Adams described it. Albert Bandura in 1977 talked about feelings of personal efficacy about doing a task. What obstacles a person feels when he or she has to perform that task and how efficiently he can complete the task are basis of personal efficacy. This was given nomenclature in his work as self-efficacy.(Bandura & Adams, 1977) Bandura (1977) defined self-efficacy as

"Self-efficacy refers to an individual's belief in his or her capacity to execute behaviours necessary to produce specific performances attainments"(Bandura & Adams, 1977)

"Academic self-efficacy refers to an individual's belief (conviction) that they can successfully achieve a designated level on an academic task or attain a specific academic goal" (Bandura, 1997).

This field of research has been studied extensively around the world where relationship of self-efficacy has been studied with mental distress, depression, anxiety, social avoidance, test anxiety, and cognitive load in medical and paramedical or allied health professionals. (Grotan et al., 2019; Hechenleitner-Carvallo et al., 2019; Salar et al., 2016; Tahmassian & Moghadam, 2011; Vasile et al., 2011)

In India problems like stress, depression, and anxiety has been studied extensively in medical students.(Cherkil et al., 2013; Sharma et al., 2013; Siddharth Sarkar, Rishi Gupta, 2017; Yadav et al., 2016) But studies which focuses on these problems among physiotherapy students in India are scarce.(Shah et al., 2016),(M. Desai et al., 2021) Research in India about studying the relationship of self-efficacy with depression, anxiety, stress, in physiotherapy students are lacking.

Researchers have studies about musculoskeletal problems and its association with psychological problems like stress, anxiety and depression. But there is a gap between interventional studies done for university students specifically Indian physiotherapy students. Studies for their stress, anxiety and depression and for musculoskeletal problems in them like back pain and hand functions are not available. Therefore, the present research wants to study these problems in physiotherapy students. The research will evaluate the comparative efficacy of high intensity interval training versus aerobic exercise with control group. And the study will explore, how the relation of self-efficacy with depression, anxiety, stress changes after exercise interventions.

Statement of Problem

1. The study of medical sciences and its allied health field are one of the most challenging fields to study and learn. This research mainly focuses on university students who are doing undergraduate courses in physiotherapy, dental and pharmacy courses. After reviewing the literature, it came out that allied health students experience depression, anxiety and stress. Various studies done in western countries have shown that a large percentage of students show signs of depression, anxiety and stress. Prevalence of anxiety and depression in university students has been studied in a few studies in India as well.

2. Burnout in university students has also been studied and found to be a common occurrence in this population. Self-efficacy in university students has been evaluated in various researches.

3. All these psychological problems are associated with poor academic performance, lack of social interaction, some times even suicidal ideation.

4. Musculoskeletal problems like non-specific low back pain, neck pain and problem in hand functions has also been studied in university students and found prevalent in this population.

5. Psychological problems and musculoskeletal problems can affect university student's efficiency, academic performance and so on, but there is dearth of studies investigating the impact of exercise intervention programs for these problems.

Significance of the study

The present research will find out the status of anxiety and depression in university students. The study will also explore the level of burn out and self-efficacy in university students. It will investigate the presence of musculoskeletal problems in university students. The focus of the study will be the effects of High intensity interval training and aerobic exercises in university students having mild to moderate anxiety and depression. The current research will study the effects of these exercise interventions on burn out and self-efficacy. The study will also explore the effects of High intensity interval training and aerobic exercises on musculoskeletal problems like back pain and hand function in university students. This study will provide us evidence-based treatment protocol for all these problems.

Aim of the study

To compare the efficacy of high intensity interval training and aerobic exercises to improve the psychological problems and musculoskeletal problems of university students who experience mild to moderate anxiety and depression. And to measure burnout and self-efficacy of students and compare the effects of exercise intervention on burnout and self-efficacy.

Objectives of the study:

1. To evaluate the status of musculoskeletal problems and psychological problems in university Students.
2. To investigate and compare the effect of High Intensity Interval Training and Aerobic Exercise on musculoskeletal problems like back pain, hand function and psychological problems like depression and anxiety in university Students.
3. To evaluate self-efficacy in university students and its association with psychological problems in these students.
4. To determine the level of burnout in university students and its association with self-efficacy in these students

Research Hypothesis

1. High Intensity Interval Training is better than Aerobic Exercise for improving musculoskeletal problems, psychological problems, burnout, and self-efficacy in university Students.
2. There is a relationship between psychological problems and self-efficacy in university Students.
3. There is a relationship between burn out and self-efficacy in university Students.

Null Hypothesis

1. There is no difference between High Intensity Interval Training and Aerobic Exercise in improving musculoskeletal problems, psychological problems, burnout, self-efficacy in university Students.
2. There is no relationship between psychological problems and self-efficacy in university Students.
3. There is no relationship between burn out and self-efficacy in university Students.

Operational definitions

Anxiety: As per American Psychiatric Association, Anxiety can be defined as "it is a feeling of tension and worried thoughts, an anticipation of future concern and is more associated with muscle tension and avoidance behavior" (Philip R. Muskin, M.D., 2021).

Depression: As per ICD 10, depression can be defined if the person has at least two of the following three symptoms – depressed mood, loss of interest in everyday activities and reduction in energy, plus two symptoms present from the remaining seven symptoms – loss of confidence, unreasonable feeling, recurrent thoughts, diminished ability to think, changes in psychomotor activity, sleep disturbance, change in appetite with weight loss.((UK), 2010)

Burn out: The International Classification of Diseases defines burn out as "Burn-out is a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed. It is characterized by three dimensions: feelings of energy depletion or exhaustion, increased mental distance from one's job, Feelings of negativism or cynicism related to one's job".

Self efficacy: self efficacy can be defined as a person's conviction about his own capability to perform in a specified way to accomplish a task. (Bandura & Adams, 1977)

High intensity interval training (HIIT): According to ACSM, High intensity interval training (HIIT) is a type of high intensity exercise program where the person's heart rate reaches more than 80% of the person's maximal heart rate(KravitZ, 2014)

Aerobic exercise: The American College of Sports Medicine defines aerobic exercise as "any activity that uses large muscle groups, can be maintained continuously and is rhythmic in nature"(Patel et al., 2017)

REVIEW OF LITERATURE

Psychological issues of students during academic years of life

Stress has been considered as a "health epidemic of 21st century by World Health Organization"(Fink, 2016). Hans Selye is known as the "Father of Stress" as he started his research in 1926. He defined Stress as "the non-specific response of the body to any demand". In psychology it is defined as "threat and discomfort, emotional tension and difficulty in adjustment"(Fink, 2017). Lu. L (1994) studied various factor which can lead to **stress** for students studying medical sciences. And they revealed that stress and anxiety affects the mental health of students (LU, 1994). Studies have shown that most of the stressors are related to their academic life – like difficulty level of curriculum, less time for family and friends, coping up with change in environment(Tushar J Palekar, 2014). Apart from this in some students stress can arise from problems with their relationships in family and friends (Bamuhair et al., 2015). Each student develop their own strategy to cope with such problems like self blaming, or criticizing their own self, low self-esteem, disconnecting from friends and family, and not sharing their problem with others and resorting to substance abuse(Cherkil et al., 2013). Sometimes students may have suicidal tendencies also(Coentre & Góis, 2018; Fan et al., 2012; Schwenk et al., 2010). In a systematic review done by R. Yousuf, M. Bakar (2013) stress was studied in Malaysian Medical students, the study revealed some interesting results. Firstly the study emphasized based on their results that the role of teacher is very crucial as they are the person students look up to. The role of teacher is important to make the learning environment less stressful for students and more conducive for learning. Secondly the most common coping strategy used by the students was engaging themselves into spirituality and religion.(Yousuf et al., 2013) Tushar J. Palekar, M.G. Mokashi illustrated that females students are more stressed than male students. Apart from emotional and academic factors study also explored some physical factors like the environment where the hostel students live, facilities provided, mode of daily transport to college, college and hostel surroundings being too noisy. All these factors affect the perceived stress of students.(Tushar J Palekar, 2014)

Stress has seen to be strongly correlated with development of anxiety and depression. Stress is a precursor of anxiety(Adams, 2004). Some anxiousness and nervousness can occur in day to day life when there is some expectation or internal conflict like before an exam or before getting on to the

stage to speak. But Anxiety is a mental disorder and it is very common. As per American Psychiatric Association, Anxiety can be defined as "an anticipation of future concern and is more associated with muscle tension and avoidance behavior" (Philip R. Muskin, M.D., 2021). A lot of studies has been done globally to find out the prevalence of anxiety stress and depression. (Mao et al., 2019) conducted a systematic review in china on medical students elaborated various factors which can lead to anxiety – the factors identified were individual factors, social, economic factors, and environmental factors. Factors like grade level, satisfaction with current major are significantly associated with anxiety. Various other interesting factors were identified to be associated with anxiety like sleep deprivation, students who has siblings, students who lived in rural areas and students with poor relationship with their family and friends. In a study done to evaluate the prevalence of stress, anxiety and depression. It was found that in Indian medical students the rates are as high as 43.9%, 40.1 %, and 32.1% in stress, anxiety and depression respectively (Sachdeva et al., 2018). There has been various studies which has studied the correlation between all these constructs and shows that they have a positive correlation.(Beiter et al., 2015)

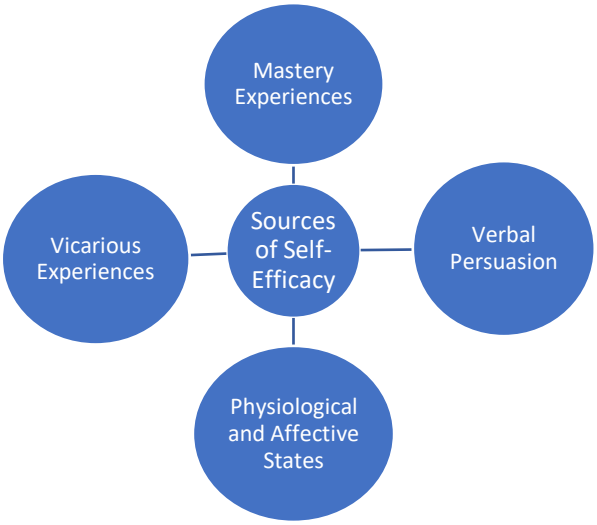
Concept of Self Efficacy in College Students

According to Bandura (1977) who is the pioneer in the work of Self Efficacy defines self efficacy as a person's conviction about his own capability to perform in a specified way to accomplish a task. In his own words Bandura defines self efficacy as "an individual's belief in his or her capacity to execute behaviours necessary to produce specific performances attainments"(Bandura & Adams, 1977)

"His study described four major factors that are the sources of self efficacy.

- Mastery experience → hands-on experience;
- Vicarious experiences → other people's experience;
- Verbal persuasion → appraisal or feedback from others;
- Physiological and affective states → stress, emotion, mood, pain, and fatigue"(Bandura & Adams, 1977)

Sources of Self Efficacy



"Academic self-efficacy refers to an individual's belief (conviction) that they can successfully achieve a designated level on an academic task or attain a specific academic goal" (Bandura, 1997).

Sharma Hemant & Nasa, Gunjan. (2014) defined Academic Self Efficacy as "a person's conviction that they can successfully achieve a designated level in a specific academic subject area."(hemant lata sharma, 2014)

This field of research has been studied extensively around the world where relationship of self efficacy has been studied with mental distress, depression, anxiety, social avoidance, test anxiety, and cognitive load in medical and paramedical or allied health professionals. (Grotan et al., 2019; Hechenleitner-Carvallo et al., 2019; Salar et al., 2016; Tahmassian & Moghadam, 2011; Vasile et al., 2011)

Self-efficacy was studied in school children around 1989 with the work of Albert Bandura and Barry. L Zimmerman. They explained self-efficacy in students going to school, and described that self-efficacy and academic development of students are interrelated terms. Self-efficacy is related to academic development in four ways- first- with self-efficacy a student can judge if can complete certain academic task given to him and it's not related to the physical aspect of student. Second – self efficacy is a multifactorial entity. Self-efficacy in English may not be same as self efficacy in mathematics. Third – self-efficacy is contextual which means that what kind of environment a students is learning in, if it is conducive to cooperative learning then student will have more

efficacy. Fourth- self-efficacy is a construct which is based on person's ability only, it doesn't take into consideration the comparison with other students. They also emphasized that self-efficacy can be measured before the activity is performed and not after the activity(Zimmerman, 1995).

Researchers also studied contructs related to self efficacy like academic self confidence(Santiago & Einarson, 1998), gender, ethinicity, relative expertise(Bong, 1998) like knowledge and use of english language. Self efficacy was also studied in students belonging to two different cultures wherein some students doesn't have english as their first language(Buriel et al., 1998)

After studying it extensively for school students in late 90's and early 2000 researchers interest developed in academic self efficacy in college or university students and in the last 20 years this area has seen extensive research.

Karineh Tahmassian, Niloufar Jalali Moghadam (2011) studied about the relationship of 5 variables i.e "Self-Efficacy, Depression, Anxiety, Worry, and Social Avoidance" in high school students and in students studying at pre-university levels. The study examined the relation of these variables by using different outcome measures. They used self-efficacy questionnaire, children depression inventory, penstate worry questionnaire, physical self-efficacy questionnaire, social avoidance distress scale, spilberger's state trait anxiety inventory. And they found a strong correlation between self-efficacy and Depression, Anxiety, Worry, and Social Avoidance.(Tahmassian & Moghadam, 2011)

Cristian Vasilea, Ana-Maria Marhan (2011) conducted a pilot study at Romanian university including 30 students with equal number of boys and girls. Age ranged from 19 to 31 years. The study evaluated the correlation between academic self-efficacy and cognitive load in a specific academic environment. For assessing self-efficacy they used Self-Efficacy Scale (SES) and for cognitive load they used Working Memory Test (WMT) and Cognitive Interference Test (CIT). The results suggested a strong correlation between working memory and self-efficacy. Their study also revealed the gender differences in academic self-efficacy and working memory as well.(Vasile et al., 2011)

Ali Reza Salar , Rahim Baghaei (2016) conducted a descriptive analytical research using a 3 part questionnaire to study the relation between test anxiety and self-efficacy. The 3 parts of the questionnaire were 1. Demographic details of students 2. Self-efficacy questionnaire 3. Test

anxiety questionnaire. Samples were the students of the city of Urmia's medical sciences university in Iran. After collecting the data and analysing it using pearson's correlation test the study concluded that there is an inverse relation of self-efficacy and test anxiety.(Salar et al., 2016)

Kirsti Grøtan, Erik R. Sund (2019) examined the association between mental distress and academic self-efficacy. They conducted a survey named as SHOT survey – student health and welfare survey 2014. And they found out that mental health, academic self-efficacy and psychological factors. For mental health they used Hopkins symptom checklist 25, for academic self-efficacy they used Norwegian version of self-efficacy scale. And under psychological factors they studied their social, lifestyle and student related variables. After analysing the data they found out that mental distress is has a strong co-relation with academic self-efficacy. The study also noted that if mental distress increases then academic self-efficacy decreases. There was one more important finding that if mental stress increases then there is decreased or delayed study progress.(Grotan et al., 2019)

Marcela I. HC, Alejandra A. Jerez (2019) conducted a research in chile. The samples of the study were undergraduate nurses, physiotherapist, students of medicine, nutrition and medical technologists. This study intend to evaluate the psychometric properties of the Academic Behavior Self-Efficacy Scale (ABSES) and to describe Self-efficacy of students from medical and paramedical career. First and second year students from the mentioned courses participated in the study (Hechenleitner-Carvallo et al., 2019).

Musculoskeletal problems in university students

Students studying at university level in professional courses like physiotherapy face lots of challenges in the form of stressors. It has been well established that many students experience stress, anxiety or depression at some time during their academic journey. And these stressors not only lead to disturbance in mental wellbeing but this also affects the body physically. All of this gives rise to musculoskeletal problems in medical and allied health student.(Ekpenyong et al., 2013). Some of the most common musculoskeletal problems in students are neck pain, back pain, shoulder pain and pain in knees. Female students are more affected than male students(Hendi et al., 2021). Many researchers have shown their interest in this topic and studied that the musculoskeletal problems are related to mental well-being.(Morais et al., 2018; Ng et al., 2019; Suija et al., 2009). (Katz, 2004) studied the effect of computer use and pattern on the body of students and found out that it

leads to musculoskeletal problems in the form of upper extremity pain and functional impairment. Back pain is also one of the major complaint of students of physiotherapy. Many times the cause of back pain is the occupational hazard to low back, which include poor posture while treating patients, handling heavy patients, muscular weakness, and lack of exercise. But researchers has emphasized that sometimes there is no known cause for back pain even on a detailed musculoskeletal assessment therefore it is very important to consider the mental well-being of these students as well. Back pain might be related to a co-existing mental problem like stress, anxiety or depression.(Pinheiro et al., 2015; Trivedi, 2004). Students also complain of problem in hand function. This is of utmost importance in the profession of physiotherapy as most of the treatment is provided through hands of the therapist and if these hands loses strength and dexterity than it will be very challenging for the student. (Sasayama et al., 2012) suggested that with severe bipolar disorders hand function reduces. (Fukumori et al., 2015; Gu et al., 2021)have also studied the association of anxiety and depression with hand grip strength. Thus it is very important to study about the effect of mental disorders on musculoskeletal system of students. And how can we prevent such disorders affecting the musculoskeletal system.

Burn out in University students

Burn out was first described by American Psychologist Herberd Freudenberger. He coined this term to acknowledge and identify problems of people relate to their work or occupation. It was first described as overwork, overstress due to work and sometimes related to inefficiency in work.(InformedHealth.org Cologne, 2006) The International Classification of Diseases defines burn out as "Burn-out is a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed. It is characterized by three dimensions: feelings of energy depletion or exhaustion, increased mental distance from one's job, Feelings of negativism or cynicism related to one's job". Burn out has been studied in university students(Brazeau et al., 2014; Brooke et al., 2020) There is prevalence of burnout in physiotherapy students in India also(Poovishnu et al., 2019). Studies have suggested that identifying the symptoms of burnout and assessing it objectively is very important. If we can identify burnout in physiotherapy students then only we can help students(Tushar J Palekar, 2014; Zeeshan Gulam Husaain1, 2020)

Exercise Intervention

1. Physiological effects of exercises on human body

Extensive research has been done to evaluate the efficacy of exercises for mental health and wellbeing(Boone et al., 2013). There is positive effect of exercise on human body.

There are various mechanism through which exercise affects human body and mind.

a. Hypothalamic-Pituitary-Adrenal Axis (HPA Axis)

In stress and anxiety there is dysregulation of HPA axis which leads to alterations in ACTH (adrenocorticotropic hormone) and excess of glucocorticoids. Exercises can control this dysregulation and alters the release of ACTH and glucocorticoids. Thus improving the function of HPA axis.

b. Monoamine System

In depression alterations in the level of monoamines have been studied. Due to this level of serotonin decreases in the frontal lobe leading to learned helplessness. When regular exercises are given it has been found that level of endorphins increases in plasma, it inhibits the CNS and improves mood and wellbeing(Jackson, 2013; Sharon-David & Tenenbaum, 2017). Synaptic transmission improves upon physical exercise which improves transmission at neuronal level by increasing serotonin and dopamine(Jackson, 2013).

c. Opioid System

Opioids induced stress and anxiety relief is another hypothesis. Endogenous opioids have a role in mood regulation(Bodnar et al., 2005). As an effect of regular exercise level of β-endorphins alters in CNS which brings the mood of patient in a positive spectrum. Some patients may feel, happy elated and euphoric also. (Anderson & Shivakumar, 2013; Thorén, P., Floras, J. S., Hoffmann, P., & Seals, 1990)

d. Neurotropic Factors

Brain derived neurotrophic factors (BDNF) have been correlated with anxiety and depression. In such mental health problems the levels of BDNF decreases(Duman & Monteggia, 2006). Animal studies have shown increased levels of BDNF in hippocampus after 20 days of regular exercises(Russo-Neustadt et al., 1999).

Apart from the above discussed physiological mechanism there are some psychological effects also which can justify the role of exercises in person with psychological problems.

2. **Psychological effects of exercises on human body**

a. Anxiety sensitivity

Anxiety sensitivity has been explained by various researchers(McNally, 2002; Taylor, 2014). It refers to a condition where a patient fears or avoids any circumstances which can create symptoms related to his/her own anxiety attacks like increase in heart rate. They always misinterpret this condition and feel that something really alarming is going to happen to them(Taylor, 2014). Some researchers tried to make patients gradually habitual of such situations like increase in heart rate, increased sweating with the help of short bouts of aerobic exercises and have found beneficial effects(Beck, J. G., and Shipherd, 1997).

b. Distraction

The exercise duration acts as break from person's constant stressful thoughts and thereby creating a distraction and thus improving psychological problems. (Berger & Motl, 2008) suggested that "time-out" is an important way to improve person's mental well-being. (R. WilliaM, 2003) used techniques other than exercises like mediation and quiet time. The initial results showed that in both cases the anxiety improved but trait anxiety improved better after exercises and also post exercises the effects are long lasting as compared to other therapies used for distraction.

Types of exercises used in the present study

1. **High Intensity Interval Training**

According to ACSM, High intensity interval training (HIIT) is a type of high intensity exercise program where the person's heart rate reaches more than 80% of the person's maximal heart rate(KravitZ, 2014). While performing exercises the person must feel it as hard or very hard exercises. The ratio commonly used by researchers for high intensity exercise and rest interval is 1:1. Role of high intensity exercise training in reducing the musculoskeletal pain has been studied recently (Verbrugghe et al., 2020) and (Verbrugghe et al., 2019) explored the effects of high intensity interval training in non-specific low back pain conditions and concluded that it is an effective, feasible and well tolerated exercise program. (Botta et al., 2022) found that this type of exercise program can help reduce painful condition. (Eather et al., 2019) demonstrated the use HIIT to improve perceived stress and anxiety in university students.

2. Aerobic Exercises

The National Institute of Health, USA defines aerobic exercise as "physical activity that increases heart rate and the body's use of oxygen. It helps improve a person's physical fitness."(NCI, 2021) The American College of Sports Medicine defines aerobic exercise as "any activity that uses large muscle groups, can be maintained continuously and is rhythmic in nature"(Patel et al., 2017). So we can say that exercises which increases heart rate, involves work of large group of muscles and most importantly uses oxygen usage by the body are aerobic exercises. Its use in mental disorders have been studied(Cornelia Herbert*, Friedrich Meixner, 2020). Aerobic exercises has shown improvements in patients with features of stress(Jackson, 2013), depression(Stanton & Reaburn, 2014) and anxiety(Bartley et al., 2013). Aerobic exercises have also found to be effective in reducing musculoskeletal pain(Korshøj et al., 2018; Tan et al., 2022)

METHODOLOGY

Study Design

Experimental research design with three parallel groups (Two Experimental and one Control group) with single blinding.

Sample Source

University Students who are pursuing their medical or allied health course that is Physiotherapy, Dental and Pharmacy Students.

Method of Sampling

Stratified Random Sampling

Sample size

The effective sample size was determined through G*Power 3.1.9.4 using statistical test of ANOVA (F-test) in three groups. While considering differences in the mean of two intervention groups for anxiety scores the effect size came out to be 0.28 (Borrega-Mouquinho et al., 2021). The sample size of 126 was shown to be necessary based on the effect size of 0.28, an alpha level of 0.05, and power of 0.80. However, we recruited 138 participants in anticipation of dropout (10%).

Inclusion Criteria

1. University students doing medical or allied health courses like Physiotherapy, Dental and Pharmacy.
2. Age group 19-25 years.
3. Students who have musculoskeletal issues such as back pain or difficulty with hand function.
4. Students having pain with VAS score of 7 or less (Brooks et al., 2019).
5. Students with a beck depression inventory II score of 28 or less(Beck, A. T., Steer, R. A., & Brown, 1996).
6. Students with a beck anxiety inventory score of 35 or less(Steer, Robert A. Beck, 1997).

Exclusion Criteria

1. Students who are having any neurological or any other systemic disease.
2. Postgraduate students and students doing internship.
3. Students who have been diagnosed with severe psychological problems and are taking regular medication for it.
4. Students with General Health Questionnaire 12 (GHQ 12) score of more than 20(Goldberg & Bedirhan Ustun, 1997).
5. Students who are doing any regular form of exercise, yoga, mindfulness etc.

Dependent Variables

- Beck Depression Inventory II
- Beck Anxiety Inventory
- General Self Efficacy Scale
- Machlachs Burn Out Inventory
- General Health Questionnaire 12
- Oswestry Low Back Pain Disability Questionnaire
- Purdue Peg Board Test
- Hand Grip Strength Using Jamar Dynamometer

Independent variables

- High intensity interval training (HIIT)
- Aerobic exercises (AE)

Instrumentation

- Weighing machine
- Stadiometer
- General Health Questionnaire
- Beck Depression Inventory II

- Beck Anxiety Inventory
- General Self Efficacy Scale
- Maslachs Burn Out Inventory
- Oswestry Low Back Pain Disability Questionnaire
- Purdue Peg Board Test
- Jamar Dynamometer for hand grip strength

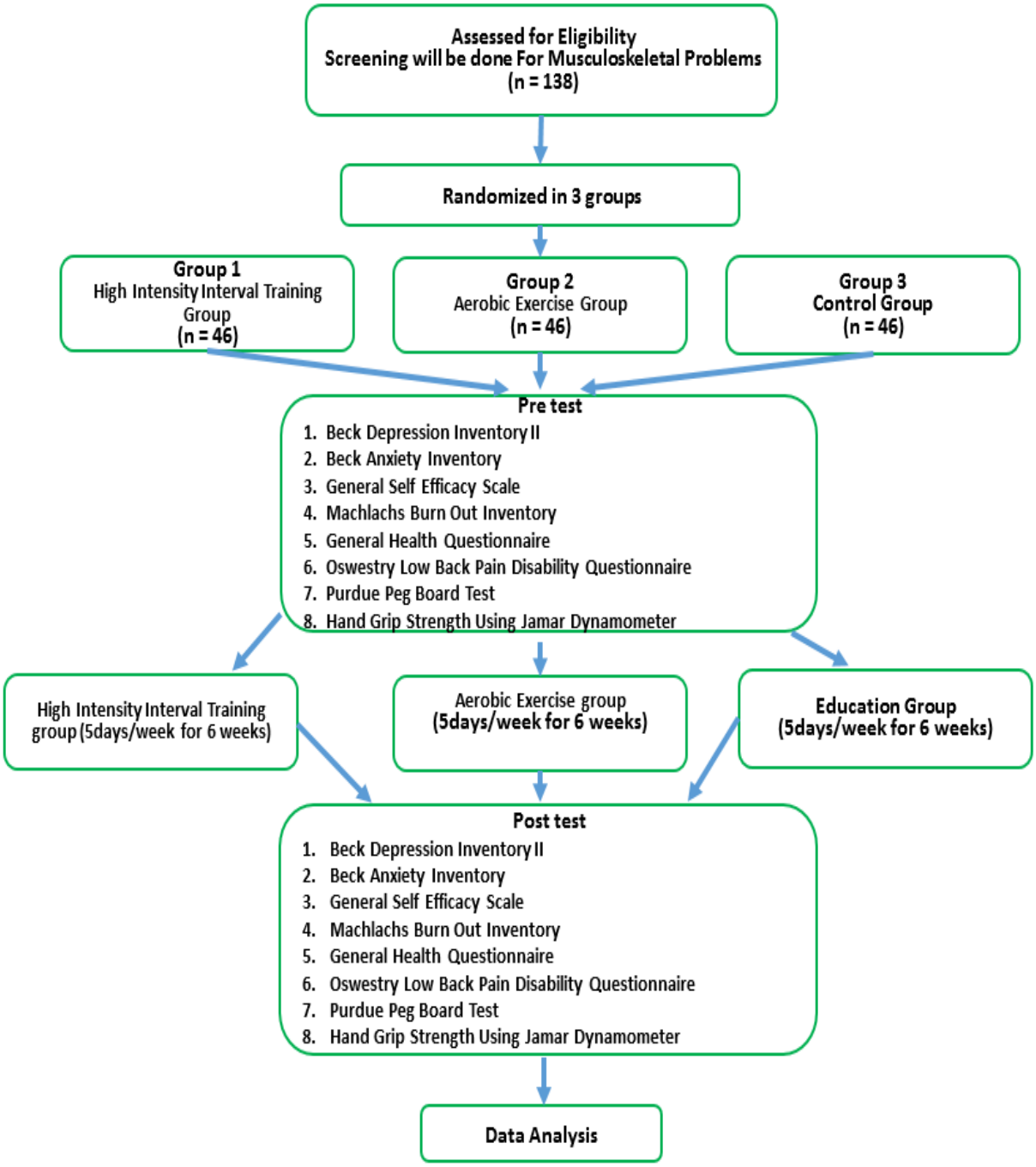

Assessed for Eligibility
Screening will be done For Musculoskeletal Problems
(n = 138)
Randomized in 3 groups
Group 1
High Intensity Interval Training Group
(n = 46)
Group 2
Aerobic Exercise Group
(n = 46)
Group 3
Control Group
(n = 46)
Pre test
1. Beck Depression Inventory II
2. Beck Anxiety Inventory
3. General Self Efficacy Scale
4. Machlachs Burn Out Inventory
5. General Health Questionnaire
6. Oswestry Low Back Pain Disability Questionnaire
7. Purdue Peg Board Test
8. Hand Grip Strength Using Jamar Dynamometer
High Intensity Interval Training group (5days/week for 6 weeks)
Aerobic Exercise group
(5days/week for 6 weeks)
Education Group
(5days/week for 6 weeks)
Post test
1. Beck Depression Inventory II
2. Beck Anxiety Inventory
3. General Self Efficacy Scale
4. Machlachs Burn Out Inventory
5. General Health Questionnaire
6. Oswestry Low Back Pain Disability Questionnaire
7. Purdue Peg Board Test
8. Hand Grip Strength Using Jamar Dynamometer
Data Analysis

Figure 1: flow chart for methodology of Study

Procedure:

University students doing physiotherapy, dental and pharmacy will be recruited from I.T.S Muradnagar College. They will be provided information about the aims and objectives of the study. Students who met the inclusion and exclusion criteria will be selected through stratified random sampling. A well informed written consent will be collected.

Screening stage

All participants will undergo a screening stage. During this screening the samples will be asked to fill Nordic Musculoskeletal Questionnaire and they will also be assessed for their musculoskeletal problems like back pain, neck pain and hand function. If the pain is related to a cause like PIVD, history of trauma or fall, any sports related injury etc then the subject will be excluded from the study. Subject who exhibits pain of unknown etiology will be included in the study.

Selected students will be randomly allocated into 3 groups – The subjects will be randomly allocated to the two Experimental groups and control group using block randomization with block size of three and allocation ratio of 1:1:1. The concealment of allocation will be ensured by using sequentially numbered, sealed and opaque envelopes.

- Group 1 - High Intensity Interval Training group
- Group 2 - Aerobic Exercise group
- Group 3 - Control Group

<u>Group 1- HIGH INTENSITY INTERVAL TRAINING GROUP</u>

Students in this group will be assessed for the Pre-test Scores on the following outcome measures. And since the participant need to complete six assessment performas and two clinical test for hand function. There is a need to divide the assessment into two parts to be performed on two different and consecutive days. General health questionnaire, beck depression inventory, beck anxiety inventory, and Oswestry low back pain disability questionnaire will be assessed on day 1. On day 2 general self efficacy scale and Machlachs burnout inventory, Purdue peg board test and hand grip strength assessment will be recorded for the participants.

1. General health questionnaire
2. Beck depression inventory

3. Beck anxiety inventory
4. General Self efficacy scale
5. Machlachs burn out inventory
6. Oswestry Low Back Pain Disability Questionnaire
7. Purdue peg board test
8. Hand grip strength using Jamar dynamometer

After this each student will undergo High Intensity Exercise Intervention for 5 days per week for 6 weeks.

Protocol for the High Intensity Interval Training (Borrega-Mouquinho et al., 2021)

HIGH INTENSITY INTERVAL TRAINING PROTOCOL

S. No.	Exercise type	No. of sets	Duration	Rest interval	Progression	Intensity
1	Push -Up	3	30-90 sec	15-60 Sec	Increase the sets (up to n=4) and/or execution time (up to 90 s) and /or decreasing resting time (up to 15s) and /or start kneeling on the extending arms into a high plank position	6-9 of RPE
2	squat	3	30-90 S	15-60 Sec	Increase the sets (up to n=4) and/or execution time (up to 90 s) and /or decreasing resting time (up to 15s) and/or use of one bottle as extra weights	6-9 of RPE
3	Dead lift	3	30-90 S	15-60 Sec	Increase the sets (up to n=4) and/or execution time (up to 90 s) and /or decreasing resting time (up to 15s) and/or use of two bottle as extra weights	6-9 of RPE
4	Plank	3	30-90 S	15-60 Sec	Increase the sets (up to n=4) and/or execution time (up to 90 s) and /or decreasing resting time (up to 15s)	6-9 of RPE

*RPE- rate of perceived exertion. The perceived exertion during the exercises will be monitored and documents as per Borg's perceived exertion scale.

After a time span of 6 weeks, the students will be again assessed on the eight outcome measures mentioned earlier. And this will be the post-test scores for high intensity interval training group.

Group 2- AEROBIC EXERCISE GROUP

Students in this group will be assessed for the Pre-test Scores on the following outcome measures:

1. General health questionnaire
2. Beck depression inventory
3. Beck anxiety inventory
4. General Self efficacy scale
5. Machlachs burn out inventory
6. Oswestry Low Back Pain Disability Questionnaire
7. Purdue peg board test
8. Hand grip strength using Jamar dynamometer

After this each student will undergo Aerobic Exercise Intervention for 5 days per week for 6 weeks.

Protocol for Aerobic Exercise (Herbert et al., 2020)

S. No.	Exercise	Warm-up/cool down	Use of arms/legs	Duration	Final exercise
1	• Run on the spot, • Turn in hips while running, • Stand upright, hands on hips and do a butt kick, • Windmill arm rotation exercise	Warm-up	Alternating use of arms/legs/sides	• 20 Sec • 15 Sec • 15 Sec • 20 Sec	Continuous Jog on the spot
2	• Raise arm overhead • Air punches to the sides • Air punches to the front • Front kicks • High knees • Diagonal kicks, wrist/toe touches • Raise arm overhead • Air punches to the sides • Air punches to the front • Front kicks • High knees • Diagonal kicks, wrist/toe touches	exercise	Alternating use of arms/legs/sides	30 Sec-40 Sec-50 Sec per exercise	Continuous Jog on the spot
3	• Run on the spot, shake out arms • Standing straddle stretch with arms hanging loose • Upper body twist and dynamic stretching to do the side • Upper body twist, stretching to the side including arms	Cool down	Alternating use of arms/legs/sides	• 15 Sec • 15 Sec • 15 Sec • 15 Sec	Continuous Jog on the spot
4	• Hop on the spot • Turning in hips while jumping • Stand upright, hands on hips and do a butt kick	Warm up	Alternating use of arms/legs/sides	• 20 Sec • 15 Sec • 15 Sec	Continuous Jog on the spot

	• Arms to the front while jumping			• 20 Sec	
5	• Arm circles • Upper cuts • Overheads (air) punches • Lateral side jumps/side to side jumps with arms crossed • Squats with side taps • X jumps • Arm circles • Upper cuts • Overheads (air) punches • Lateral side jumps/side to side jumps with arms crossed • Squats with side taps • X jumps	Exercises	Alternating use of arms/legs/sides	30 Sec-40 Sec-50 Sec per exercise	Continuous Jog on the spot
6	• Wiggle on tip-toe, lift heels • Standing straddle stretch, shake out thighs, • Arm reach slowly overhead, stretching arms • Upperbody twist, stretching to the side including arms	Cool down	Alternating use of arms/legs/sides	• 15 Sec • 15 Sec • 15 Sec • 15 Sec	Continuous Jog on the spot

After 6 weeks of aerobic exercise training, the students will be again assessed on the eight outcome measures mentioned earlier. And this will be the post-test scores for group 2.

Group 3 – CONTROL GROUP

- Control group will be the education and pamphlet group.
- Pre-test scores will be taken on the eight outcome measures at the beginning of 6 weeks.
- This group will be provided with a pamphlet.
- Pamphlet will consist of some tips to reduce anxiety and stress.
- It will also have some exercises like deep breathing exercise and relaxation exercises.
- Advice to do a daily physical activity like walking/cycling.
- All information will be conveyed once by the researcher to the participant.
- The participant can contact the researcher if needed.
- The participant will meet the researcher after 6 weeks and the post-test scores will be taken for this group also.

Assessment tools used in the study

1. General health questionnaire is a self-administered assessment tool which is used to screen people for psychiatric conditions. It has been used extensively in research for screening purpose. It was first developed by Goldberg and Hillier in 1979, the questionnaire at that time had 60 questions (GHQ-60). Then it was restructured and reduced to 30 questions (GHQ-30), then GHQ-28 and in the present study we are using GHQ 12 which was developed in 1988. The 12 item version can be easily used in patients coming to clinics and hospitals. Also this questionnaire can be used in research purpose also. This twelve item measure has a total score of 0-36. A score of 11 or 12 is typical, more than 15 is distress and more than 20 is considered as severe psychological distress. The cronbach alpha for reliability is 0.76, and external validity is 0.82 (María del Pilar Sánchez-López and Virginia Dresch, 2008) This scale gives a basic screening about psychological problems of a person though a thorough psychiatric assessment is still required.
2. Beck Depression Inventory (BDI) is the most commonly used self-administrative tool to assess the presence of depression in people. It was developed by Aaron Beck and colleagues in 1961. This is one of most commonly used tool for assessment of depression

in research. The scale was revised to Beck Depression Inventory IA by Aaron Beck in 1978. And presently the version which is available and most widely used is BDI II. This was revised in 1996 as per the DSM Criteria for Mental disorders. BDI II has 21 items that can be scored on a 4 point scale ranging from 0 to 3. It takes approximately 5-10 minutes to complete the inventory. Test-retest Reliability of beck depression inventory II is 0.93. It has high internal consistency of $\alpha = 0.91$(Beck, A. T., Steer, R. A., & Brown, 1996). When compared to the original BDI, it shows high construct validity of 0.93(Aaron T. Beck, Robert A. Steer, 1996). Scoring of BDI II can be divided in 4 categories minimal range, mild, moderate and severe. Total scoring is 0-63. Minimal range = 0-13, mild = 14-19, moderate = 20-28, severe = 29-63.

3. Beck Anxiety Inventory (BAI) has been used extensively since its development. And it was developed by Spielberger in1970. This scale was developed to objectively assess the features of anxiety in people. It is a self-administered scale containing 21 items which are marked by the patient on a 4 point likert scale (0 to 3) where 0 means not at all and 3 means severely. The total score ranges from 0-63. Scoring is divided into categories of minimal(1-5), mild (6-15), moderate(16-30), and severe (31-63)(Steer, Robert A. Beck, 1997).
4. Self-efficacy is an important concept which enables a person to work at its best. If students have poor self-efficacy their academic performance is negatively affected(Chemers et al., 2001; Hayat et al., 2020). Self-efficacy can be measured using a standardized tool called General Self Efficacy Scale (GSE Scale)(Jerusalem, M., & Schwarzer, 1992). This scale can objectively measure a person's self-efficacy. It is a self-reported scale of self-efficacy with 10 items, scored on a scale of 1 to 4. The total score of the scale ranges from 10-40. Higher the score means better self-efficacy. The internal consistency of the scale is 0.86 (Schwarzer & Diehl, 2002).
5. Burnout is an important aspect with regard to mental health and therefore it has been studied by many researchers(InformedHealth.org Cologne, 2006)(Sandeep Grover, Swapnajeet Sahoo, Ashish Bhalla, 2018). In university students also the prevalence of burn out is high(Brazeau et al., 2014; Brooke et al., 2020). The most standardized scale for measurement of burnout is Maslach's Burnout inventory. This scale was developed by Christina Maslach and Susan E. Jackson. The scale measures three domains – emotional exhaustion, depersonalization, and personal accomplishment. It is a self-administered scale with 22

items. How frequently the person feels about those items has to be scored from 0-never to 6- everyday. The scale gives details under 3 domains therefore scoring should be done for each domain. First is emotional exhaustion, if the person scores is 17 or more - low level burn out, 18-29 moderate burn out, more than 30 – high level of burn out. For depersonalization, 5 or less - low level burn out, 6-11 moderate burn out, 12 or more – high level of burn out. For Personal Accomplishment, 33 or less – high level of burn out, 34-39 moderate burn out, 40 or more - low level burn out. Scores higher on emotional exhaustion and depersonalization and lesser on personal accomplishment indicates that the person is having burnout. The cronbach's alpha for emotional exhaustion is 0.86, depersonalization-0.63, and personal accomplishment-0.72 (Powers, Stephen, 1986).

6. Oswestry Low Back Pain Disability Questionnaire is the most widely used questionnaire to evaluate the functional outcome in patients with low back pain. The scale has 10 sections for which the patient has to choose the best possible answer. Each section has six statements out of which patient has to choose one. Statement one is marked as '0' and statement six is marked as '5'. The total score possible is 50. And for each patient, score must be obtained as percentage out of 50. So "0%-20% is minimal disability, 21%-40% is moderate disability, 41%-60% is severe disability, 61%-80% crippled, 80%-100% is bed-bound"(Alcántara-Bumbiedro et al., 2006; Fairbank, J. C., & Pynsent, 2000)
7. Assessment of hand function is a broad term which includes motor, sensory and functional assessment of hand. One of the commonly studied variable is hand dexterity. Purdue Peg Board test is a standardized hand assessment tool to evaluate gross motor activity of hand and upper extremity and fingertip dexterity. The test consists of an equipment in the form of a board. The board contains four cups/containers at the top of the board and there are two vertical rows in the centre of the board containing 25 holes. The two outermost cups contains 25 pins each and the central cups contains 40 washers and 20 collars. The test is conducted under 5 conditions. The patient has to use firstly the right hand(30 seconds), then left hand(30 seconds), both hands(30 seconds), right and left both hands(this is the sum of condition 1 and 2), and assembly(60 seconds)(D. K Lindstrom-Hazel, 2015). (Amirjani et al., 2011) evaluated the inter-class correlation coefficient (ICC) in patients with carpal tunnel syndrome and found out that was 0.91. Also (Buddenberg & Davis, 2000) examined

the three trial administration of Purdue peg board test and evaluated its test-retest reliability as more than 0.80.

8. The present study will also measure hand grip strength using Jamar dynamometer. For measuring hand grip strength objectively, use of dynamometer is widely accepted by American Society of Hand therapist for clinical as well as research purpose(Hogrel, 2015). Jamar dynamometer measures the isometric grip in pounds and kilograms allowing maximum upto 200 lbs or 90 kilograms which is displayed by a needle deflection. Jamar dynamometer shows good inter-rater and test retest reliability(Mathiowetz et al., 1984).

PROPOSED OUTCOME OF THE RESEARCH

A university student's life is full of challenges. The study focuses on allied health students. They have to learn medical as well as course specific subjects, not only the theory but also hands on techniques. These courses require long hours of study so there is usually less time for friends, family and also for extra-curricular activities. There is also an expectation from the family to do well in academics. And some students also feel stressed regarding getting admission in a good college for post-Graduation program. Student's mental well-being may get affected due to all of this. When a student doesn't feel stable or strong mentally, it usually disturbs their study routines and may affect their academic performance. My study will be collecting information in the form of self-reported scales for the preliminary assessment of depression and anxiety. The study will also collect information about burn out in students pursuing medical courses. Self-efficacy of students will also be measured through a self-assessment instrument. A 6-week intervention program will be given to the two exercise groups i.e high intensity interval training and aerobic exercise training and education through pamphlet to control group. And after the data collection results will be analyzed for status of anxiety, depression, burn out and self-efficacy in these students. Students will also be analyzed for musculoskeletal problems like back pain and hand function. The effect of exercise interventions will be studied and the study will try to find out which type of exercise provide better results in students for reducing their psychological problems and musculoskeletal problems. This study will provide important information and data regarding university student's mental health, level of burn out and their self-efficacy. The study can be an initiation point in this area where such constructs are studied for Indian university students. In North India there are large number of universities offering allied health courses and these higher

educational institutes then can work on these factors. With the knowledge of best type of exercise intervention in university students we can work towards reducing their psychological problems, burnout and improve their self-efficacy. With evidence-based exercise programs we can improve their musculoskeletal problems associated with depression and anxiety. So that collectively as a society we give our students best environment to learn and excel in their academic journey.

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